Lot Size Influence

- Lot size has very little to no influence on sampling plans.

A common misperception Because of standard tables

1. Select Lot Size
2. …

Lot or batch size			Special inspection levels				General inspection levels		
			S-1	S-2	S-3	S-4	I	II	III
2	to	8	A	A	A	A	A	A	B
9	to	15	A	A	A	A	A	B	C
16	to	25	A	A	B	B	B	C	D
26	to	50	A	B	B	C	C	D	E
51	to	90	B	B	C	C	C	E	F
91	to	150	B	B	C	D	D	F	G
151	to	280	B	C	D	E	E	G	H
281	to	500	B	C	D	E	F	H	J
501	to	1200	C	C	E	F	G	J	K
1201	to	3200	C	D	E	G	H	K	L
3201	to	10000	C	D	F	G	J	L	M
10001	to	35000	C	D	F	H	K	M	N
35001	to	150000	D	E	G	J	L	N	P
150001	to	500000	D	E	G	J	M	P	Q
500001	and	over	D	E	H	K	N	Q	R

Lot Size Influence

These are Not valid

Sample size code letter	Sample size	Acceptance Quality Limits, *AQLs*, in Percent Nonconforming Items and Nonconformities per 100 Items (Normal Inspection)																									
		0.010	0.015	0.025	0.040	0.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5	10	15	25	40	65	100	150	250	400	650	1000
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re
A	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↓	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31
B	3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45
C	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45	↑
D	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45	↑	↑
E	13	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45	↑	↑	↑
F	20	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑
G	32	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑
H	50	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑
J	80	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑
K	125	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
L	200	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
M	315	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
N	500	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
P	800	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Q	1250	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
R	2000	↑	↑	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑

↓ = Use the first sampling plan below the arrow. If sample size equals, or exceeds, lot size, carry out 100 percent inspection.

↑ = Use the first sampling plan above the arrow.

Ac = Acceptance number.

Re = Rejection number.

- Down Arrow Note is commonly overlooked.
- Minimum sample size is necessary to achieve lower AQL levels.

Type Control Chart	Sample size n	Central Line*	Control Limits
Average & Range	<10, but usually 3 to 5	$\bar{\bar{X}} = \frac{(\bar{X}_1+\bar{X}_2+\ldots\bar{X}_k)}{k}$	$UCL_{\bar{x}} = \bar{\bar{X}} + A_2\bar{R}$ $LCL_{\bar{x}} = \bar{\bar{X}} - A_2\bar{R}$
$\bar{X}$ and R		$\bar{R} = \frac{(R_1+R_2+\ldots R_k)}{k}$	$UCL_R = D_4\bar{R}$ $LCL_R = D_3\bar{R}$
Average & Standard Deviation	Usually ≥10	$\bar{\bar{X}} = \frac{(\bar{X}_1+\bar{X}_2+\ldots\bar{X}_k)}{k}$	$UCL_{\bar{x}} = \bar{\bar{X}} + A_3\bar{s}$ $LCL_{\bar{x}} = \bar{\bar{X}} - A_3\bar{s}$
$\bar{X}$ and s		$\bar{s} = \frac{(s_1+s_2+\ldots s_k)}{k}$	$UCL_s = B_4\bar{s}$ $LCL_s = B_3\bar{s}$
Median & Range	<10, but usually 3 or 5	$\bar{\tilde{X}} = \frac{(\tilde{X}_1+\tilde{X}_2+\ldots\tilde{X}_k)}{k}$	$UCL_{\tilde{x}} = \bar{\tilde{X}} + \tilde{A}_2\bar{R}$ $LCL_{\tilde{x}} = \bar{\tilde{X}} - \tilde{A}_2\bar{R}$
$\tilde{X}$ and R		$\bar{R} = \frac{(R_1+R_2+\ldots R_k)}{k}$	$UCL_R = D_4\bar{R}$ $LCL_R = D_3\bar{R}$
Individuals & Moving Range	1	$\bar{X} = \frac{(X_1+X_2+\ldots X_k)}{k}$	$UCL_X = \bar{X} + E_2\bar{R}_m$ $LCL_X = \bar{X} - E_2\bar{R}_m$
X and R_m		$R_m = \lvert(X_{i+1} - X_i)\rvert$ $\bar{R}_m = \frac{(R_1 + R_2+\ldots R_{k-1})}{k-1}$	$UCL_{Rm} = D_4\bar{R}_m$ $LCL_{Rm} = D_3\bar{R}_m$

k = # of subgroups, $\tilde{X}$ = median value within each subgroup

*$\bar{X} = \frac{\Sigma X_i}{n}$

Sample size	Hartley's constant	c_4 constant	For charts based on ranges			For charts based on standard deviations		
			Xbar chart limits	R chart limits		Xbar chart limits	S chart limits	
n	d_2	c_4	A_2	D_3	D_4	A_3	B_3	B_4
2	1.128	0.7979	1.880	*	3.267	2.659	*	3.267
3	1.693	0.8862	1.023	*	2.575	1.954	*	2.568
4	2.059	0.9213	0.729	*	2.282	1.628	*	2.266
5	2.326	0.9400	0.577	*	2.115	1.427	*	2.089
6	2.534	0.9515	0.483	*	2.004	1.287	0.030	1.970
7	2.704	0.9594	0.419	0.076	1.924	1.182	0.118	1.882
8	2.847	0.9650	0.373	0.136	1.864	1.099	0.185	1.815
9	2.970	0.9693	0.337	0.184	1.816	1.032	0.239	1.761
10	3.078	0.9727	0.308	0.223	1.777	0.975	0.284	1.716
11	3.173	0.9754	0.285	0.256	1.744	0.927	0.321	1.679
12	3.258	0.9776	0.266	0.283	1.717	0.886	0.354	1.646
13	3.336	0.9794	0.249	0.307	1.693	0.850	0.382	1.618
14	3.407	0.9810	0.235	0.328	1.672	0.817	0.406	1.594
15	3.472	0.9823	0.223	0.347	1.653	0.789	0.428	1.572
16	3.532	0.9835	0.212	0.363	1.637	0.763	0.448	1.552
17	3.588	0.9845	0.203	0.378	1.622	0.739	0.466	1.534
18	3.640	0.9854	0.194	0.391	1.608	0.718	0.482	1.518
19	3.689	0.9862	0.187	0.403	1.597	0.698	0.497	1.503
20	3.735	0.9869	0.180	0.415	1.585	0.680	0.510	1.490
21	3.778	0.9876	0.173	0.425	1.575	0.663	0.523	1.477
22	3.819	0.9882	0.167	0.434	1.566	0.647	0.534	1.466